

Social Network Limits Language Complexity

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Linguists have long noted that rich morphological patterns tend to appear in languages spoken by small groups more than larger ones (Evans, 2009), and some have suggested that smaller social groups are simply better at supporting the kinds of innovation that lead to these developments (Trudgill, 2001; Nettle, 2012). In addition, languages seem to favour syntactic means over morphological ones as they grow in size. Indeed, empirical evidence suggests the typological patterning that languages display may be connected to aspects of the social network of the speakers (Bromham, 2015). Languages with smaller and more isolated speaker populations tend to make much greater use of morphology than those with larger and more wide-spread populations.

However, beyond correlational evidence, a mechanistic account of how languages gain and maintain complexity is lacking. A major limitation with extant approaches is the assumption that language changes diffuse like diseases (Ke, 2008). Under these accounts, innovations are like viruses, and contact with someone else infected with the innovation causes one to become infected themselves. However, while language change certainly depends on contact with others, grammatical innovation does not spread like a virus, but is instead the result of social learning (Nettle, 2012). Thus, the mechanisms whereby the pattern of connectivity between speakers influence language change, and realistic modelling of usage-based evolution of a language need further elucidation.

To examine mechanistically this connection between social and language structure, we propose a novel agent-based model of grammatical innovation. Rather than learning through instant, infectious contact, agents update their knowledge via a usage-based process where innovation happens through intergenerational transfer. We test two social typologies, one that mimics the social structure of small hunter-gather groups, and the other that of hierarchical, stratified societies. Using complex network methods we identify global transitivity as a physical parameter of social networks critical for developing morphological structure, and hubs associated with scale-free networks as inhibitory, encouraging syntactic composition instead. Results from our simulations (Lou-Magnuson & Onnis, 2018) support the hypothesis that topologies typical of small human populations promote the development of morphological structures, while those of larger communities lack such capacity, and may in fact lead to inhibitory conditions that encourage the shift to syntactic over morphological patterns. Thus we offer the first causal explanation for the correlation between the grammatical patterning and social properties of a community.

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